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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,919	02/04/2004	Frank Hershkowitz	JJD-0403	3488

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EXAMINER
WARTALOWICZ, PAUL A

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,919	HERSHKOWITZ ET AL.	
	Examiner	Art Unit	
	PAUL A. WARTALOWICZ	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 7/18/08 have been fully considered but they are not persuasive.

Applicant argues that Barr's reforming space velocity is roughly 75 h^{-1}.

However, it is unclear that Barr teaches that space velocity. Even if Barr teaches that space velocity, Barr is not relied upon to teach space velocity.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that the present invention doesn't oxidize the feed stock, add water to the syngas to cool it to the claimed temperature, or reform the feedstock to a temperature below 700°C.

However, none of these limitations are excluded by the claim language. The claim uses open-type comprising language such that these limitations are within the scope of the claims.

Applicant argues that operating the process taught by Kobayashi at the reforming, water gas shift, and combustion temperatures taught by Towler would likely result in inoperative reforming or highly inefficient reforming.

However, it doesn't appear that Kobayashi teaches that the temperatures taught by Towler would result in inoperative reforming or highly inefficient reforming. It appears that Kobayashi only teaches that there is a maximum temperature (col. 3).

Applicant argues that Hirata teaches reforming at low pressure to improve equilibrium at low reforming temperatures and that this results in the need to add a compressor to pressurize the reform product for use in the gas turbine.

However the instant claim recites using oxygen provided as compressed air from a gas turbine. it is unclear why the skilled practitioner would not be motivated by Hirata to use compressed air in the regenerative cycle of a reverse flow reactor as instantly claimed.

Applicant argues that none of the rejected claims recite a second reforming zone.

However, Sederquist teaches one reforming zone comprising reforming catalyst and packing material and a second zone comprising packing material (col. 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi ‘530 in view of Barr ‘835 and any one of Tonkovich ‘506 or Khandkar ‘114.

Kobayashi teach a process for producing hydrogen comprising reacting steam with hydrocarbon to produce synthesis gas, passing the synthesis gas to a shift reactor to increase the concentration of hydrogen, adsorbing gases other than hydrogen and recovering hydrogen, desorbing gas species with oxidant to produce hot combustion gas; and passing the hot combustion gas through the reactor bed to heat the regenerative reactor bed (col. 8). Kobayashi also teach that it is known to use a pressure swing adsorber (col. 1).

Although Kobayashi does not specifically disclose carrying out the method in a “pressure swing reformer”, the process carried out appears to be substantially similar. Additionally, Kobayashi teach that the pressure of the process can be elevated to a desired level by controlling flow rates of the feed streams and product streams (col. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the pressure of the process, since it has been held that discovering an optimum value or a result effective variable involved only routine skill in the art. In re Boesch, 617 F.2nd 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to optimize the pressure by the reasoned explanation that controlling flow rates of feed and product streams to elevate process pressure is well known in the art.

Additionally, Barr teaches a process for producing hydrogen (col. 1) wherein the reforming process is carried out under pressure for the purpose of avoiding compressing costs (col. 1).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a reforming process is carried out under pressure in Kobayashi in order to avoid compressing costs (col. 1) as taught by Barr.

Kobayashi fail to teach the claimed space velocity of the reaction.

Tonkovich teach a method of steam reforming hydrocarbons (col. 5) wherein the reactions are carried out at the claimed space velocities (col. 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide the hydrocarbon reforming reactions are carried out at the claimed space velocities (col. 12) in a well known method of producing syngas from hydrocarbon reforming as taught by Tonkovich.

Khandkar teach a method of steam reforming hydrocarbons (col. 3) wherein the reactions are carried out at a space velocity of 350 h^{-1} (col. 19).

Khandkar also teach that manufacturer of the reformer suggests a space velocity of 2000 h^{-1} and that the cost of the catalyst is lower for higher space velocities (col. 19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the space velocity of the reformer, since it has been held that discovering an optimum value or a result effective variable involved only routine skill in the art. In re Boesch, 617 F.2nd 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to optimize the space velocity of the reformer by the reasoned explanation that the manufacturer of the reformer suggests a space velocity of 2000 h^{-1} and that the cost of the catalyst is lower for higher space velocities as taught by Khandkar.

Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '530 in view of Barr '835 and Towler '994 and any one of Tonkovich '506 or Khandkar '114.

Kobayashi teach a process as described above.

Kobayashi fail to teach the claimed temperature of the flue gas exiting the reformer, the claimed temperature of the synthesis gas provided by the reforming temperature conditions.

Towler teach a process for producing hydrogen (col. 1) wherein it is known to produce reformate effluent stream at a temperature below 700°C (col. 13) that is passed to a water gas shift reaction zone operated at a temperature of about 400-450°C (col.

14). Additionally, Towler teach combusting waste products with air to produce flue gas (col. 6) wherein the flue gas is at a temperature of 400-800°C for the purpose of providing heat to the steam reforming and pre-reforming zone (col. 12).

Therefore it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide reformate effluent stream at a temperature below 700°C that is passed to a water gas shift reaction zone operated at a temperature of about 400-450°C and flue gas is at a temperature of 400-800°C for the purpose of providing heat to the steam reforming and pre-reforming zone in Kobayashi because it is well-known in the art to operate these substantially similar processes (reforming, water gas shift, combustion) at the claimed temperatures as taught by Towler.

Additionally, Kobayashi teach that it is known to use pressure swing adsorption process to separate hydrogen from other gases (col. 1).

Kobayashi also teach that at least part of the flue gas is recycled to the reformer (col. 5-6, fig. 2) and teach a process for producing steam using indirect heat exchange (col. 3).

Therefore, it would have been obvious to use at least part of the flue gas created in the combustion process to produce steam because the flue gas is used in heat-exchange processes in the process and because steam is created in the process using indirect heat exchange.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '530, or in the alternative, in view of Barr '835 in view of Hirata '239 and any one of Tonkovich '506 or Khandkar '114.

Kobayashi teach a process for producing hydrogen as described above.

Kobayashi differs in that the air provided in the regeneration cycle is compressed air.

Hirata teach a turbine and reformer system (col. 1) wherein fuel is combusted with compressed air (col. 3) for the purpose of providing electricity and providing means for raising the temperature of the reformer (col. 3).

Therefore it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide fuel combusted with compressed air in Kobayashi in order to provide electricity and providing means for raising the temperature of the reformer.

Claims 10-15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '530 in view of Barr '835 and Towler '994 and Sederquist '805 and any one of Tonkovich '506 or Khandkar '114.

Kobayashi teach a process for producing hydrogen comprising reacting steam with hydrocarbon to produce synthesis gas, passing the synthesis gas to a shift reactor to increase the concentration of hydrogen, adsorbing gases other than hydrogen and recovering hydrogen, desorbing gas species with oxidant to produce hot combustion

gas; and passing the hot combustion gas through the to heat regenerative reactor bed (col. 8). Kobayashi also teach that it is known to use a pressure swing adsorber (col. 1).

Although Kobayashi et al. does not specifically disclose carrying out the method in a "pressure swing reformer", the process carried out appears to be substantially similar. Additionally, Kobayashi et al. teach that the pressure of the process can be elevated to a desired level by controlling flow rates of the feed streams and product streams (col. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the pressure of the process, since it has been held that discovering an optimum value or a result effective variable involved only routine skill in the art. In re Boesch, 617 F.2nd 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to optimize the pressure by the reasoned explanation that controlling flow rates of feed and product streams to elevate process pressure is well known in the art.

Additionally, Barr teaches a process for producing hydrogen (col. 1) wherein the reforming process is carried out under pressure for the purpose of avoiding compressing costs (col. 1).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a reforming process is carried out under pressure in Kobayashi et al. in order to avoid compressing costs (col. 1) as taught by Barr.

Kobayashi fail to teach the claimed temperature of the flue gas exiting the reformer, the claimed temperature of the synthesis gas provided by the reforming temperature conditions.

Towler teach a process for producing hydrogen (col. 1) wherein it is known to produce reformate effluent stream at a temperature below 700°C (col. 13) that is passed to a water gas shift reaction zone operated at a temperature of about 400-450°C (col. 14). Additionally, Towler teach combusting waste products with air to produce flue gas (col. 6) wherein the flue gas is at a temperature of 400-800°C for the purpose of providing heat to the steam reforming and pre-reforming zone (col. 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide reformate effluent stream at a temperature below 700°C that is passed to a water gas shift reaction zone operated at a temperature of about 400-450°C and flue gas is at a temperature of 400-800°C for the purpose of providing heat to the steam reforming and pre-reforming zone in Kobayashi because it is well-known in the art to operate these substantially similar processes (reforming, water gas shift, combustion) at the claimed temperatures as taught by Towler. Additionally, Kobayashi teach that it is known to use pressure swing adsorption process to separate hydrogen from other gases (col. 1).

Kobayashi also teach that at least part of the flue gas is recycled to the reformer (col. 5-6, fig. 2).

Kobayashi teach a process for producing steam using indirect heat exchange (col. 3).

Therefore, it would have been obvious to use at least part of the flue gas created in the combustion process to produce steam because the flue gas is used in heat-exchange processes in the process and because steam is created in the process using indirect heat exchange.

Kobayashi fail to teach two reforming zone, the first reforming zone containing packing materials and a steam reforming catalyst and the second reforming zone containing bed packing materials at a temperature lower than the first reforming zone.

Sederquist teach a reforming process for producing hydrogen (col. 1) wherein there are two zones wherein the first zone contains packing comprising alumina or magnesium oxide (col. 6) and a steam reforming catalyst (col. 8) and that packing material may be present in both zones (col. 8).

From this disclosure it would have been obvious to one of ordinary skill in the art to provide a first reforming zone containing packing materials and a steam reforming catalyst and the second zone containing bed-packing materials at a temperature lower than the first reforming zone because Sederquist teaches that both zones may contain only packing material but that reform catalyst may be used to drive the hydrocarbon conversion to completion.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was provided to provide a first reforming zone containing packing materials and a steam reforming catalyst and the second zone containing bed-packing materials at a temperature lower than the first reforming zone in Kobayashi because Sederquist clearly suggests the embodiment and both Kobayashi and

Sederquist are drawn to substantially similar processes including reforming, combusting, and water gas shift reactions.

Kobayashi fail to teach the claimed space velocity of the reaction.

Tonkovich teach a method of steam reforming hydrocarbons (col. 5) wherein the reactions are carried out at the claimed space velocities (col. 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide the hydrocarbon reforming reactions are carried out at the claimed space velocities in a well known method of producing syngas from hydrocarbon reforming as taught by Tonkovich.

Khandkar teach a method of steam reforming hydrocarbons (col. 3) wherein the reactions are carried out at a space velocity of 350 h^{-1} (col. 19).

Khandkar also teach that manufacturer of the reformer suggests a space velocity of 2000 h^{-1} and that the cost of the catalyst is lower for higher space velocities (col. 19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the space velocity of the reformer, since it has been held that discovering an optimum value or a result effective variable involved only routine skill in the art. In re Boesch, 617 F.2nd 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to optimize the space velocity of the reformer by the reasoned explanation that the manufacturer of the reformer suggests a space velocity of 2000 h^{-1} and that the cost of the catalyst is lower for higher space velocities as taught by Khandkar.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '530 in view of Barr '835 and Towler '994 and Sederquist '805 and Hirata '239 and any one of Tonkovich '506 or Khandkar '114.

Kobayashi teach a process for producing hydrogen as described above.

Kobayashi fail to teach the air provided in the regeneration cycle is compressed air.

Hirata teach a turbine and reformer system (col. 1) wherein fuel is combusted with compressed air (col. 3) for the purpose of providing electricity and providing means for raising the temperature of the reformer (col. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide fuel combusted with compressed air in Kobayashi in order to provide electricity and providing means for raising the temperature of the reformer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. WARTALOWICZ whose telephone number is (571)272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
September 26, 2008

/Steven Bos/
Primary Examiner
A.U. 1793